

New bridge “in pérgola” for high speed trains to the northwest of Spain

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ABSTRACT

During the years 2008 to 2010 it will be constructing in Spain the new railway line of high velocity trains that will connect Valladolid with the northwest of Spain. One of the first phases comprises the connection of provinces Palencia and León with a train of 300 km/h of speed.

The new phase with an inversion of 22 million Euros will cross the provinces of Palencia and León in direction to Galicia on the North West of Spain. This phase comprises 5 great viaducts from 116 to 450 meters.

The present paper exposes the project and construction of one of the most singular bridge which crosses above the existing motorway M-31. The solution of the bridge has been made “in pérgola” according with the Spanish terminology.

The project of the bridge called “Pérgola over the existing motorway M-31” was realized by means of a complete three-dimensional model of finite elements with the program SAP2000N that includes all the elements of the structure, that is, sub-structure comprising foundations made with piles (4500 m of piles), mat foundations tying the piles, pillars, and the superstructure comprising a prestressed concrete slab, and the complete abutments. The length of the bridge is 156 m with a width of 14.5 m.

The 3D finite element model of the complete bridge made with SAP2000N comprises 8806 nodes, 6366 frame elements and 2326 shell elements and the number of hypothesis studied was 1306 with static and dynamic situations.

